UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,386	12/15/2003	Bruce Whitefield	03-1345	6227

24319 7590 10/20/2008

LSI CORPORATION
1621 BARBER LANE
MS: D-105
MILPITAS, CA 95035

EXAMINER	
JONES, HUGH M	

ART UNIT	PAPER NUMBER
2128	

MAIL DATE	DELIVERY MODE
10/20/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/736,386	WHITEFIELD ET AL.	
	Examiner	Art Unit	
	Hugh Jones	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-21 of U.S. Application 10/736,386 filed 12/15/2003 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2, 5-21 are rejected under 35 U.S.C. 102(b) as anticipated by Jordan III et al. (of record).

4. Jordan discloses a method for calculating high-resolution wafer parameter profiles comprising the steps of:

a. Defining an appropriate product/device input dataset (column 10 lines 35-46, data gathering and sampling on a surface) for a plurality of different die sizes and products (column 12 lines 51-64), wherein the dataset comprises physical correlation reference points comprising information relating to the size of each die in two directions as well as the location of at least one of the corners of each die; (See at least fig. 7-8).

b. Collecting a die level bin yield dataset for one of the products/devices defined in step (a) (column 12 lines 37-43) by using the product/device input dataset to generate a table of data for the lots and wafers of said one of the products/devices with the virtual die (column 12 lines 61-

64) coordinate for each die and its corresponding value (sweeping, collecting a value for each value in the sweep, column 12 lines 44-51);

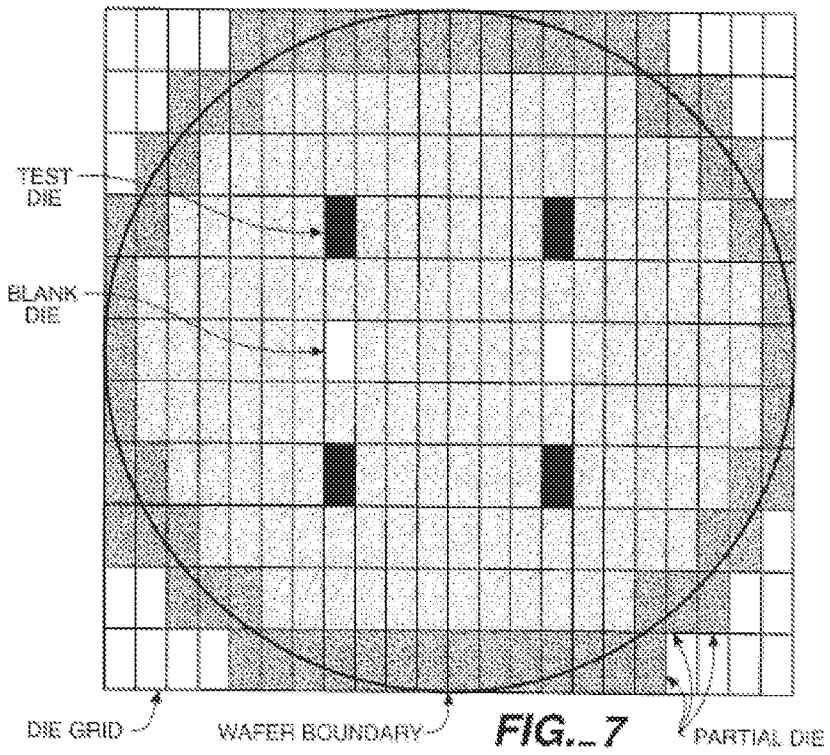

FIG._7

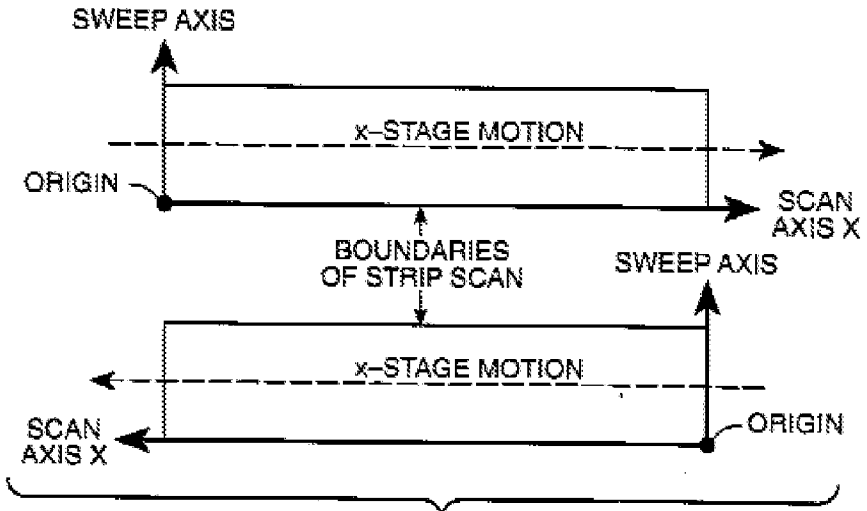

FIG._8

c. Calculating a single composite value for each die coordinate (column 11 line 51-56, calculating intensity);

d. Defining where on the virtual die it is desired to assign a composite value (column 12 line 65-column 13 line 2, intensity and aligning the beam with the virtual pattern on the location to be sampled);

e. Calculating physical coordinates for each die value using the corresponding virtual coordinate and physical translation key (column 15 line 61-column 16 line 5, shows that coordinate locations are calculated for each intensity value);

f. Repeating steps (b), (c), (d) and (e) for each of said die sizes and products defined in step (a) (column 14 lines 41-46, multiple events being processed);

g. Merging the data from a plurality of files into one file (column 14 line 54, merging events);

h. Defining a grid (column 10 lines 37-51);

i. Creating a table with all the possible grid coordinates that would fit on a production wafer (column 25, line 47-column 26 line 6, generating convolution data given a wafer size);

j. Defining a smoothing algorithm (column 16 lines 58-61, interpolation exploiting smooth shape);

k. Calculating the smoothed value for each point on the grid from the combined data (column 16 lines 50-58); and

I. Plotting a wafer profile (figures 18 and 19).

As per claim 2,

Jordan discloses normalizing the composite die values so that they are mergeable with values from the other products (column 11 lines 30-38, figure IB, Gaussian distribution).

As per claim 5,

Jordan discloses the appropriate product/device input dataset being defined by a variety of devices sizes (column 12 lines 37-43, comparison of multiple strip units) with die level data and different die sizes (column 12 lines 52-61, different sizes of strip units).

As per claim 6,

Jordan discloses the appropriate product/device input dataset being defined by products/devices which represent the same process flow to be modeled (column 3 lines 54-64, finding intensities on all pixels).

As per claim 7,

Jordan discloses the appropriate product/device input dataset being defined by a sufficient number of lots from each device to calculate a reasonable average result value for each die (column 16 lines 36-39).

As per claim 8,

Jordan discloses the appropriate product/device input dataset being defined by die size for each device (column 12 lines 52-61).

As per claim 9,

Jordan discloses the appropriate product/device input dataset being defined by at least one reference physical correlation point between a specific virtual coordinate and an actual physical location on the wafer (column 12, line 65-column, 13 line 2).

As per claim 10,

Jordan discloses the calculated single composite value for each die coordinate being an average of the data from all the individual lots and wafers corresponding to the die site (column 20, lines 6-11).

As per claim 11,

Jordan discloses the calculated single composite value for each die coordinate being a max of the data from all the individual lots and wafers corresponding to the die site (column 20, lines 33-37).

As per claim 12,

Jordan discloses the calculated single composite value for each die coordinate being a sum of the data from all the individual lots and wafers corresponding to the die site (column 25 lines 47-56).

As per claim 13,

Jordan discloses the calculated single composite value for each die coordinate being a percentage of the data from all the individual lots and wafers corresponding die site (column 17 lines 38-45).

As per claim 14,

Jordan discloses the composite value being assigned to a comer of the die nearest an edge of the wafer (column 9 lines 29-31).

As per claim 15,

Jordan discloses the composite value being assigned to a corner of the die nearest a center of the wafer (column 10 lines 12-14).

As per claim 16,

Jordan discloses the composite value being assigned from a center of the die (column 17 lines 5-8).

As per claim 17,

Jordan discloses a Cartesian coordinate system being used to calculate physical coordinates (column 12 lines 20-23, stage coordinate).

As per claim 18,

Jordan discloses a polar coordinate system being used to calculate physical coordinates (column 12 lines 20-23, wafer coordinate).

As per claim 19,

Jordan discloses the wafer profile being scaled, in equal increments of a range of values (column 19 lines 38-44).

As per claim 20,

Jordan discloses the wafer profile being scaled in equal percentiles of the data (column 25 lines 6-11).

As per claim 21,

Jordan discloses the wafer profile being plotted to show a three-dimensional contour map of the data (figure 7).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jordan as applied to claims 1-2 and 5-21 above, in view of Misutake et al., US Patent no. 6,885,950.

8. Jordan does not disclose expressly a Poisson Defect Density normalizing algorithm being used to perform the step of normalizing the composite die values so that they are mergeable with values from the other products. Mitsutake discloses a method for extracting wafer parameters including using a Poisson Defect Density normalizing algorithm to normalize the data so that they can be merged (column 7 lines 14-23).

9. It would have been obvious, at the time of the present invention, to modify Jordan's wafer extraction method with Mitsutake's Poisson Defect Density normalizing algorithm in order to normalize composite die value so they can be merged with values from different products. The motivation for doing so would have been to represent random defects within the extracted wafer parameter profiles (Mitsutake column 7 lines 36-63).

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jordan as applied to claims 1-2 and 5-21 above, in view of Maaya et al. US Patent no. 7,065,239.

11. Jordan does not disclose expressly a max-min scaling normalizing algorithm being used to perform the step of normalizing the composite die values so that they are mergeable with values from the other products. Maaya discloses a method for extracting wafer parameters including using a max-min scaling normalizing algorithm to normalize the data so that they can be merged (column 14 lines 32-42).

12. It would have been obvious, at the time of the present invention, to modify Jordan's wafer extraction method with Maaya 's max-min scaling normalizing algorithm in order to normalize composite die value so they can be merged with values from different products. The motivation for doing so would have been to stabilize the range of parameters for a wafer (Maaya column 14 lines 42-44).

Response to Arguments

13. Applicant's arguments filed 10/7/2008, have been fully considered and are not persuasive.

14. Applicants argue (pg. 2):

> In the most recent Office Action (mailed July 7, 2008), the Examiner asserted that this is disclosed in Figure 7 of Jordan, III et al. Applicant respectfully traverses. Figure 7 of Jordan, III et al. merely illustrates a wafer, and the fact that it includes a repeating pattern (see col. 12, lines 37-43). Figure 7 of Jordan, III et al. discloses a plurality of dies on a wafer and that the dies have corners, etc., but does not disclose providing a dataset which comprises information relating to the size of each die in two directions as well as the location of at least one of the corners of each die.

15. Applicants also argue (pg. 3):

> Applicant respectfully submits that Jordan, III et al. fails to disclose defining a dataset as recited in claim 1 (i.e., one which comprises physical correlation reference points comprising information relating to the size of each die in two directions as well as the location of at least one of the corners of each die), let alone using the dataset as recited in claim 1 (i.e., to generate a table of data for the lots and wafers of said one of the products/devices with a virtual die coordinate for each die and a corresponding value).

(Note the claim only requires "information relating to the size of each die in two dimensions as well as the location of at least one of the corners of each die"). See at least fig. 7 (cited in the rejection of the last office action for the same reasons):

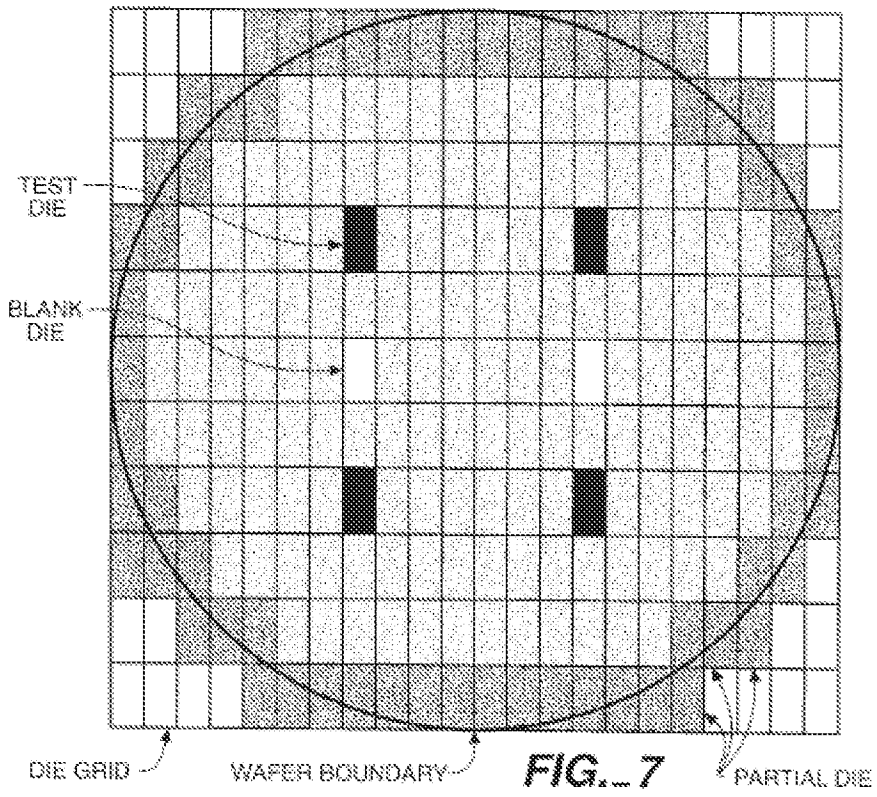

FIG._7

The figure discloses at least a die grid including coordinates for the dies – in other words . "information relating to the size of each die in two dimensions as well as the location of at least one of the corners of each die".

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to: Hugh Jones telephone number (571) 272-3781,

Monday-Thursday 0830 to 0700 ET,

or

the examiner's supervisor, Kamini Shah, telephone number (571) 272-2279.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label *PROPOSED* or *DRAFT*).

/Hugh Jones/

Primary Examiner, Art Unit 2128

October 16, 2008